

FeatureLanguage

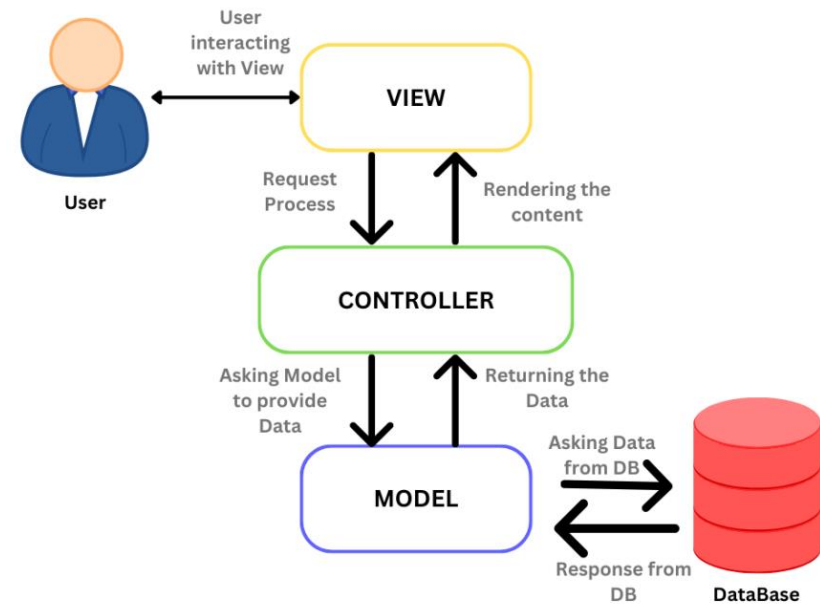
Erica De Petrillo

McGill University

SEMTL

Model-Driven Engineering Courses

- Semester-long project: MVC application
- Learning by example?
 - Beneficial for students
 - Time-consuming for teaching staff

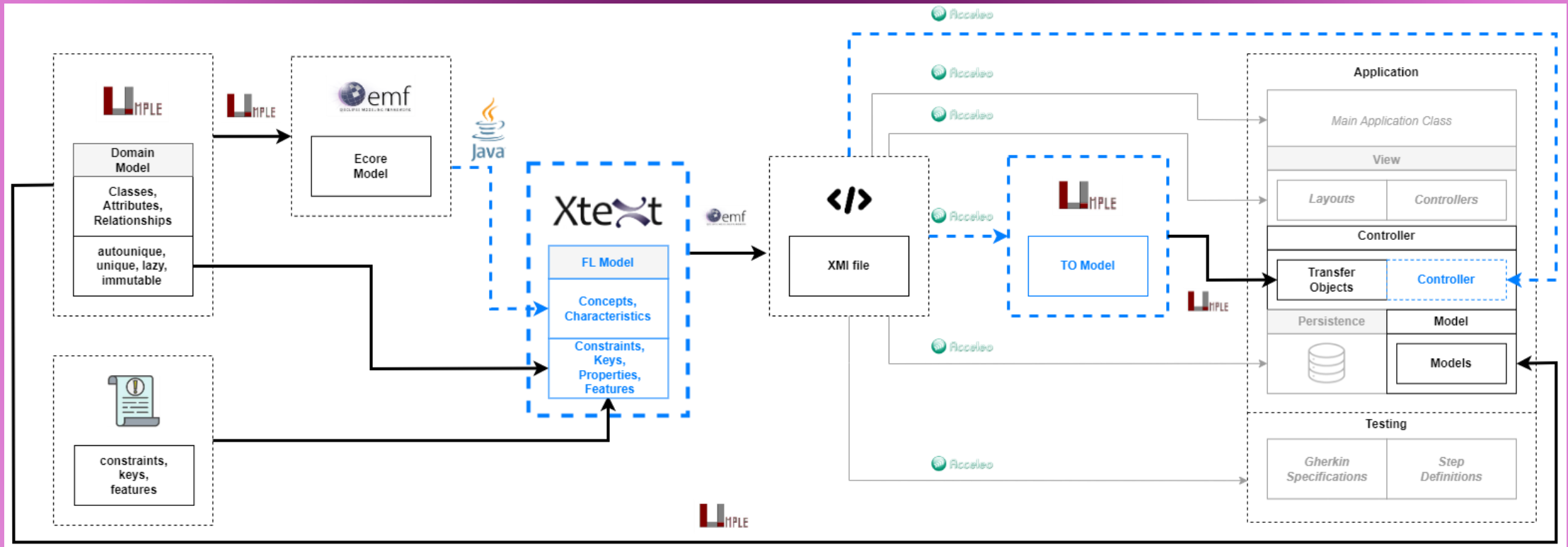


- Unless they use FeatureLanguage...

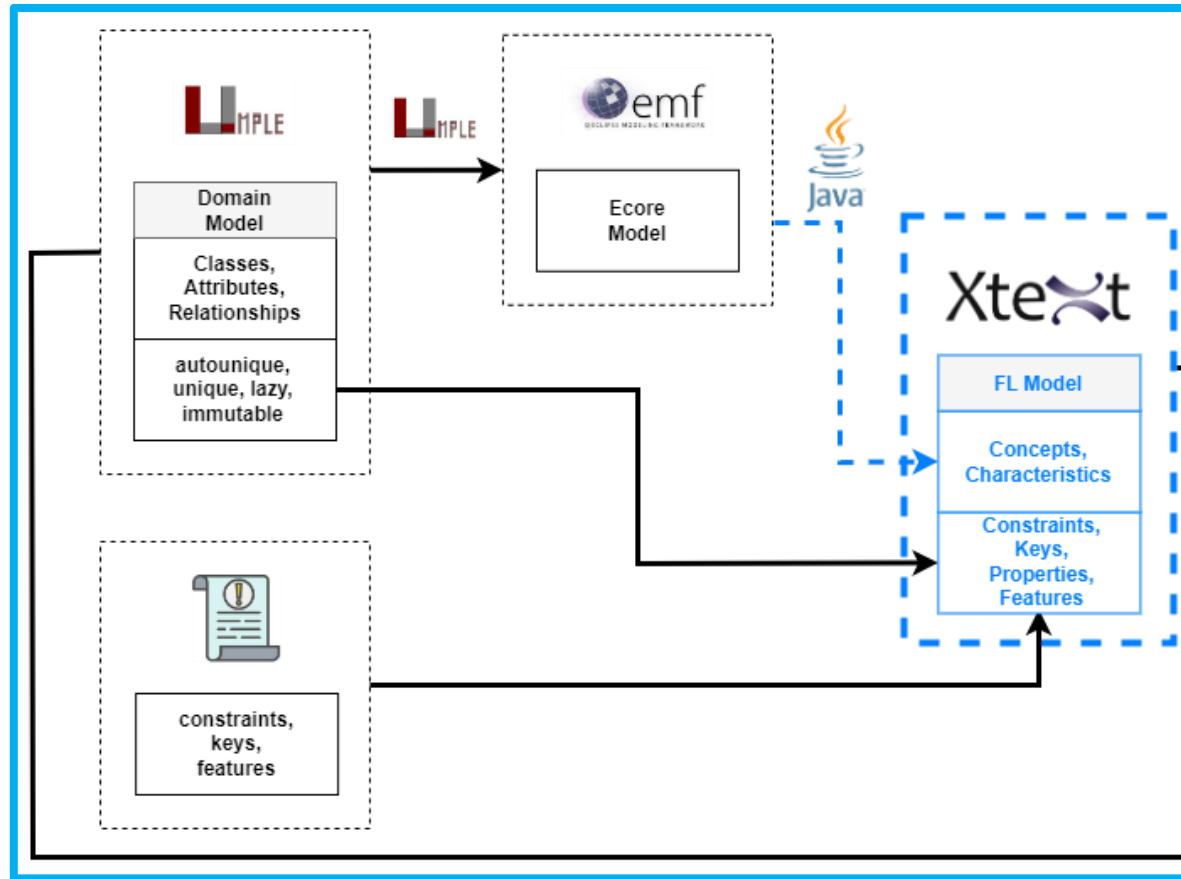
Process

- MVC app
 - Handwritten code ✗
 - Generated code ✓
- Input
 - Domain model
 - Extra specification
- Output
 - Sample solution

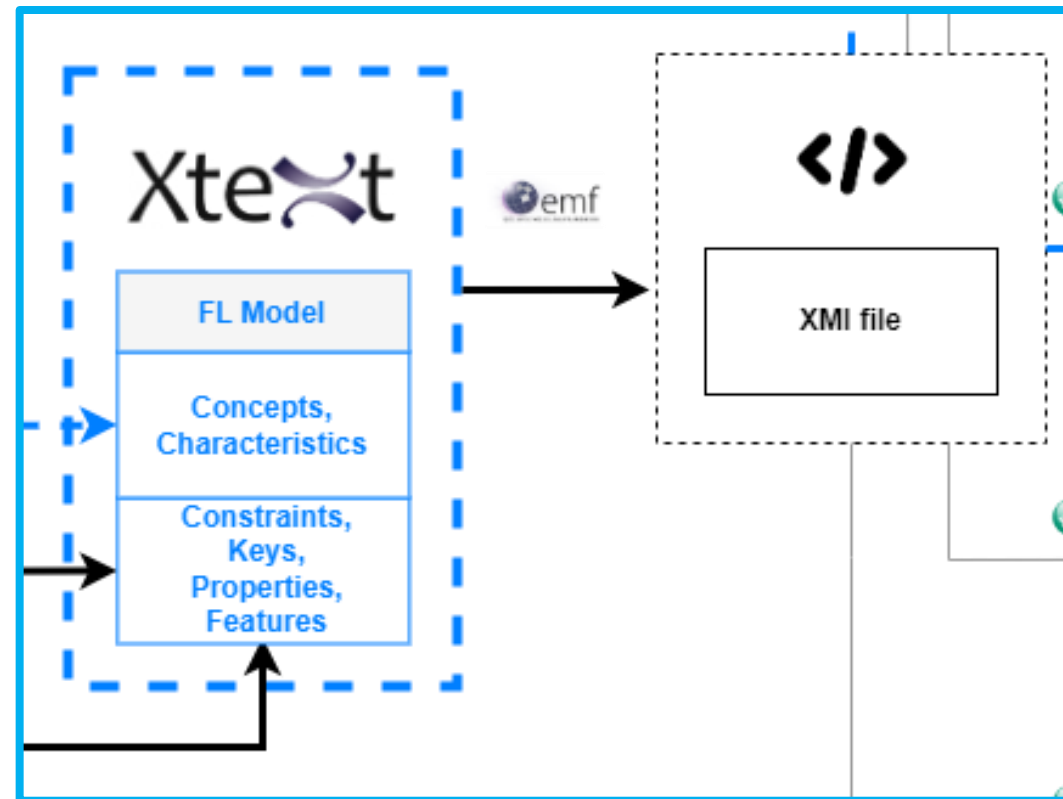
Transformation Pipeline



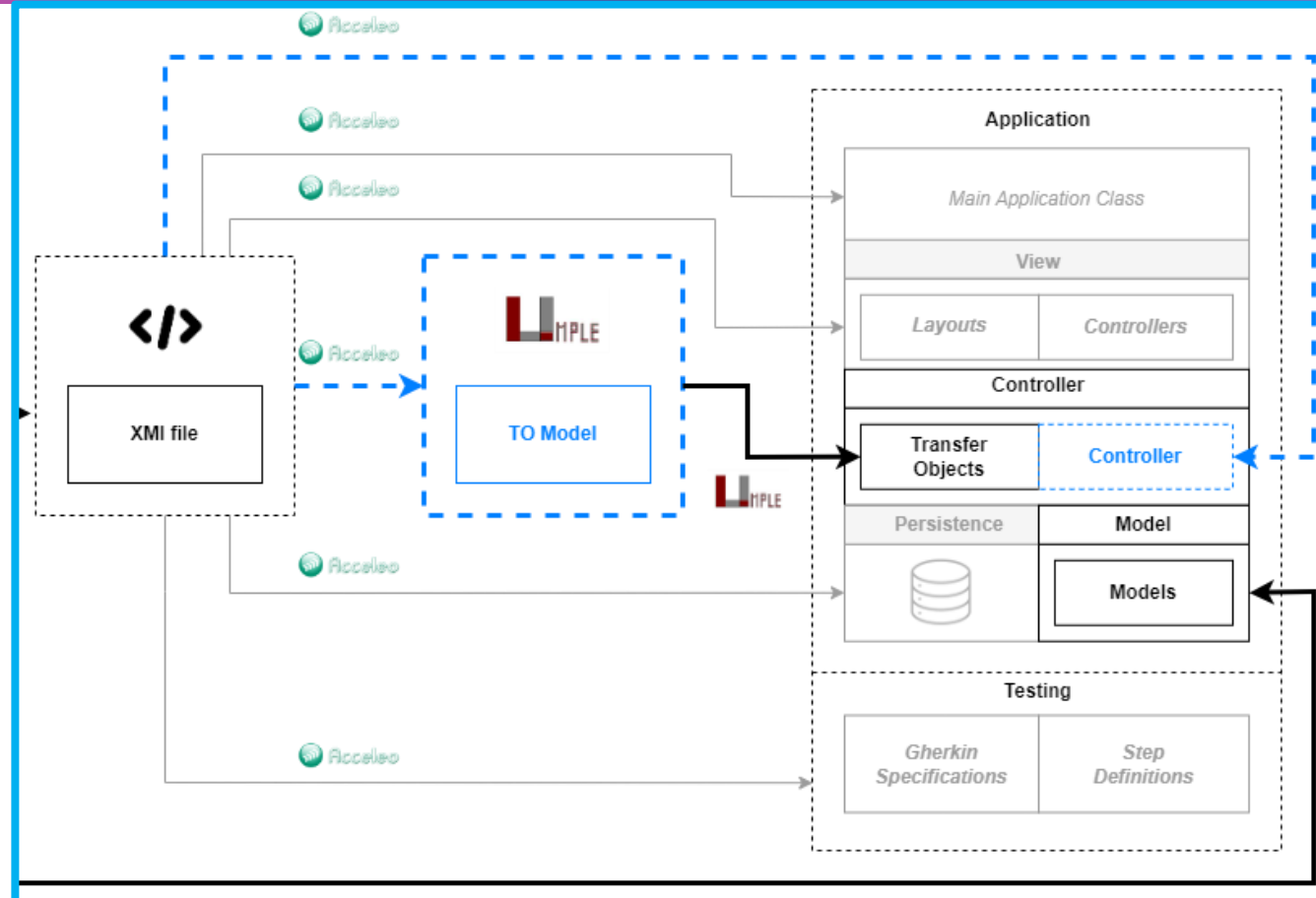
Project Info -> FeatureLanguage



FeatureLanguage -> XMI



XMI -> MVC App



FeatureLanguage

- DSL
- Created using Xtext
- Sections
 - Concepts
 - Constraints
 - Keys
 - Properties
 - Features

```
1 concept MinimalRestoApp
2   Table tables 0..*
3   Order orders 0..*
4
5 concept Table
6   int number
7   int maxNumberSeats
8   MinimalRestoApp minimalRestoApp 1..1
9   Seat seats 0..*
10  Order orders 0..*
11  Location location { Indoors Patio }
12
13 concept Seat
14   boolean isArmChair
15   Table table 1..1
16
17 concept Order
18   Date date
19   Time time
20   int number
21   MinimalRestoApp minimalRestoApp 1..1
22   Table table 0..1
23
24 constraints
25   Table.number > 0 "The table number must be greater than 0"
26
27 keys
28   Table.number unique
29   Table.seats index
30   Order.number autounique
31
32 properties
33   MinimalRestoApp root
34   Table.maxNumberSeats lazy
35
36 features
37   Add Table
38   Remove Table
39   Display Table
40   Update Table
41   Add Table.seats
42   Remove Table.seats
43   Display Table.seats
44   Update Table.seats
45   Update Table.location
46   Add Order
47   Remove Order
48   Display Order
49   Update Order
```


Concepts

- Generated from domain model
- Textual representation of domain model
- Uml class = FL Concept
- Uml attribute = FL Characteristic
- Uml association = FL
- Uml inheritance

Built-in Types:

- int
- byte
- short
- long
- float
- double
- boolean
- char
- String
- Date
- Time

```
1 concept MinimalRestoApp
2   Table tables 0..*
3   Order orders 0..*
4
5 concept Table
6   int number
7   int maxNumberSeats
8   MinimalRestoApp minimalRestoApp 1..1
9   Seat seats 0..*
10  Order orders 0..*
11  Location location { Indoors Patio }
12
13 concept Seat
14   boolean isArmChair
15   Table table 1..1
16
17 concept Order
18   Date date
19   Time time
20   int number
21   MinimalRestoApp minimalRestoApp 1..1
22   Table table 0..1
```

Constraints

```
24 constraints
25     Table.number > 0 "The table number must be greater than 0"
--
```

- Filled by hand from the project instructions
- Dot notation: `Concept.characteristic`
- Operators:
 - Less than `<`
 - Less than or equal `<=`
 - Equal `=`
 - Greater than or equal `>=`
 - Greater than `>`
- Value
- Error Message
- Limitations

Keys

- Filled in by hand using
 - Domain model information
 - Project instructions
- All Concepts except root need a Key

• Unique keys	→	27	keys
• Autounique keys	→	28	Table.number unique
• Index keys	→	29	Table.seats index
	→	30	Order.number autounique
		31	

Properties


- Filled in by hand using:
 - Domain model information

- `ConceptProperty`

- Mandatory
- Declares root

- `CharacteristicProperty`

- Optional
- Defines `Characteristic` as `lazy` or `immutable`



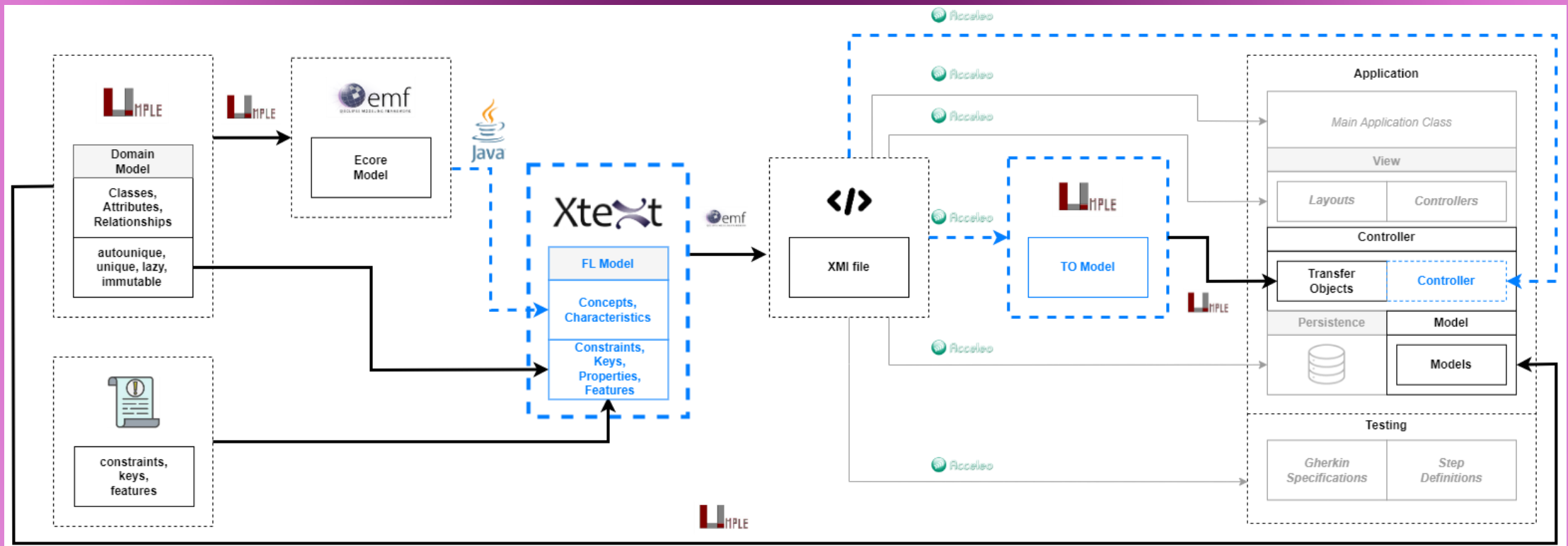
```
32 properties  
33   MinimalRestoApp root  
34   Table.maxNumberSeats lazy
```

Features

- Filled in by hand using:
 - Project instructions
- Four types:
 - Add
 - Can act on Concepts
 - Can act on Characteristics representing associations
 - Remove
 - Can act on Concepts
 - Can act on Characteristics representing associations
 - Display
 - Can act on Concepts
 - Can act on Characteristics representing associations
 - Update
 - Can act on Concepts
 - Can act on Characteristics representing associations
 - Can act on Characteristics representing attributes

```
36 features
37   Add Table
38   Remove Table
39   Display Table
40   Update Table
41   Add Table.seats
42   Remove Table.seats
43   Display Table.seats
44   Update Table.seats
45   Update Table.location
46   Add Order
47   Remove Order
48   Display Order
49   Update Order
```

Transformation Pipeline



- Thick Black: Already Existed
- Dashed Blue: Current Implementation
- Thin Grey: Future Work